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Description of a new species of *Entedonomphale* (Hymenoptera: Eulophidae) from Bulgaria, with notes on *E. carbonaria*

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Description of a new species of *Entedonomphale* (Hymenoptera: Eulophidae) from Bulgaria, with notes on *E. carbonaria*. - A new distinctive species of the genus *Entedonomphale* Girault (Hymenoptera: Eulophidae: Entedoninae), *E. bulgarica* Boyadzhiev & Triapitsyn sp. n., is described from the mountains of southwestern and southeastern Bulgaria. The European species *E. carbonaria* (Erdös) is newly recorded from the Nearctic region (USA). An identification key to both sexes of the Palaearctic species of *Entedonomphale* is provided.

Keywords: Hymenoptera - Eulophidae - Entedoninae - *Entedonomphale* - taxonomy - Bulgaria - screen-sweeping net.

INTRODUCTION

The rarely collected genus *Entedonomphale* Girault, 1915 (Hymenoptera: Eulophidae: Entedoninae) was recently revised on a worldwide basis by Triapitsyn (2005). The species of *Entedonomphale* are larval parasitoids of Phlaeothripidae (Thysanoptera: Tubulifera) (Triapitsyn, 2005). In Europe, this genus is represented by two species, *E. bicolorata* (Ishii, 1933) and *E. carbonaria* (Erdös, 1954) (Triapitsyn, 2005).

Here we diagnose, describe, and illustrate a new, very distinctive species of *Entedonomphale* that was collected by the senior author first by screen sweeping at low elevation on the Pirin Mt. in southwestern Bulgaria; later 3 males of the same species were collected on the Sakar Mt. in southeastern Bulgaria. Additionally, we provide new information on the distribution of *E. carbonaria*, which was recently discovered in the Nearctic region (Oregon, USA). An identification key to both sexes of the Palaearctic species of *Entedonomphale* is also provided.

MATERIAL AND METHODS

The type specimens were collected with a modified net (Fig. 10) for screen sweeping (after Noyes, 1982) and fixed in 96% alcohol. In laboratory they were dried from ethanol using a critical point drier and point-mounted, and then the female and one of the males (from the same locality as the female) were cleared in 10% KOH,

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dissected, and slide-mounted in Canada balsam. The slide-mounted specimens were examined under a Zeiss Axioskop 2 plus compound microscope (using Nomarski differential interference contrast optics) and photographed using a Sony DSC-S75 digital still camera. Morphological terminology follows Gibson (1997); measurements (as length or length:width for the wings) are given in micrometers (μm). The examined specimens are deposited in the collections indicated by the following acronyms: MHNG, Muséum d'histoire naturelle, Geneva, Switzerland; PUPB, Department of Zoology, University of Plovdiv "Paisii Hilendarski", Plovdiv, Bulgaria; UCDC, The R.M. Bohart Museum of Entomology, Department of Entomology, University of California, Davis, California, USA; and UCRC, Entomology Research Museum, Department of Entomology, University of California, Riverside, California, USA. An abbreviation used in the key and description is: F = antennal funicular segment.

RESULTS

Genus *Entedonomphale* Girault

Key to the Palaearctic species

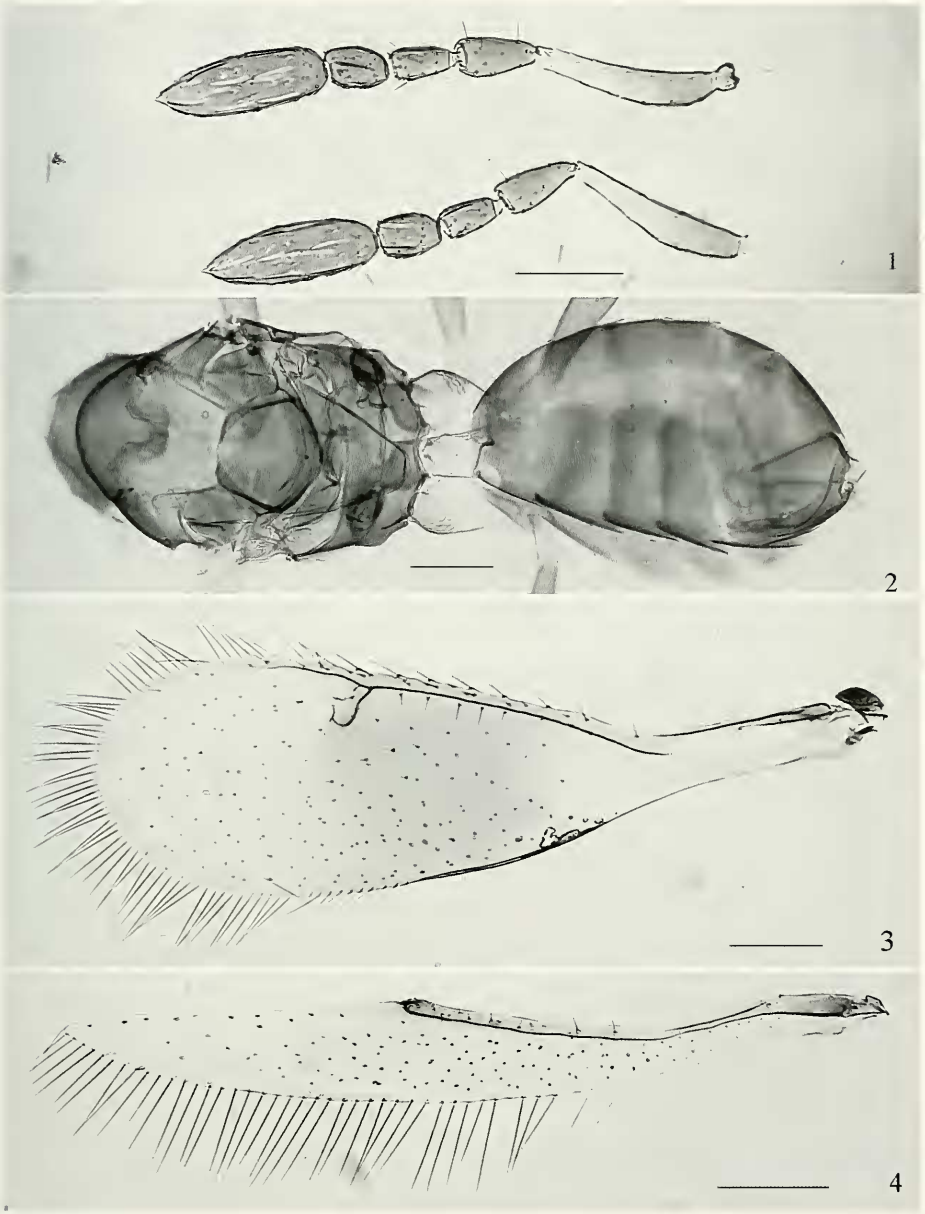
[male of *E. bicolorata* (Ishii) is unknown]

1 Female (antenna with a 2-segmented funicle and an entire clava) 2
- Male (antenna either with a 3-segmented funicle and an entire clava or with a 2-segmented funicle and a 3-segmented clava) 4
2(1) Forewing disc completely hyaline, without a transverse dark band in the middle . . . . . *E. bicolorata* (Ishii)
- Forewing disc with a conspicuous transverse dark band in the middle 3
3(2) F1 almost as long as F2 (only slightly shorter); postmarginal vein 2.4-2.6 x length of stigmal vein; ovipositor 0.6 x length of metatibia . . . . . *E. bulgarica* Boyadzhiev & S. Triapitsyn sp. n.
- F1 markedly shorter than F2; postmarginal vein about as long (1.0 x) as stigmal vein; ovipositor 1.1 x length of metatibia . . . . . *E. carbonaria* (Erdös)
4(1) Antenna with a 2-segmented funicle and a 3-segmented clava . . . . . *E. bulgarica* Boyadzhiev & S. Triapitsyn sp. n.
- Antenna with a 3-segmented funicle and an entire clava . *E. carbonaria* (Erdös)

Entedonomphale bulgarica Boyadzhiev & S. Triapitsyn, sp. n. Figs 1-9

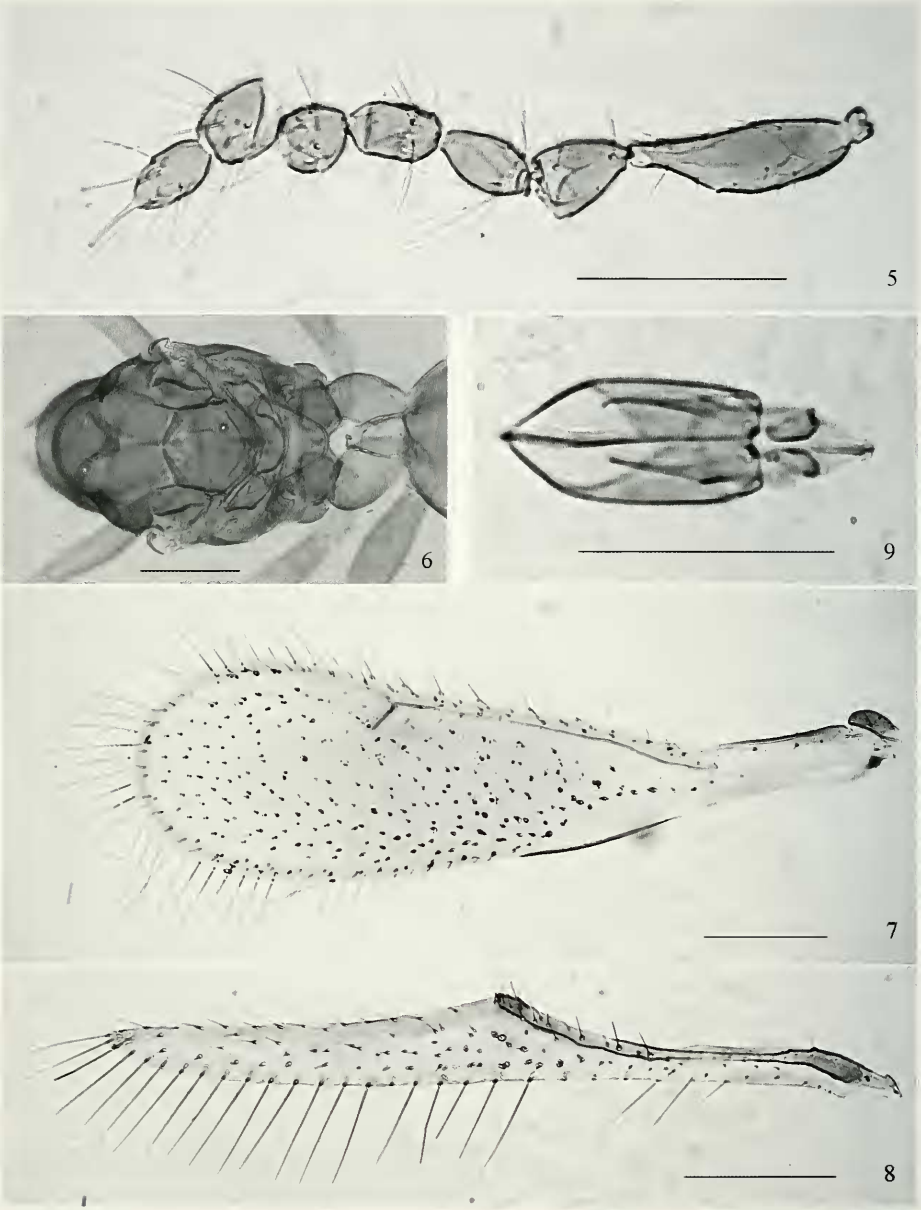
Type material: *Holotype*: female on slide [MHNG]: BULGARIA, Blagoevgrad Region, Pirin Mt., 2 km W of Hadzhidimovo, 41°31'15"N, 23°50'40"E, 495 m, 8.ix.2006, P.S. Boyadzhiev. *Paratypes*: 1 male on slide [PUPB], same data as the holotype. 3 males on points: BULGARIA, Stara Zagora Region, Sakar Mt., 1 km NE of Madrets Village: 42°07'55"N, 26°05'38"E, 140 m, 26.iv.2007, P.S. Boyadzhiev [2 males, PUPB, UCRC]; 42°08'06"N, 26°06'11"E, 160 m, 26.iv.2007, A.M. Stojanova [1 male, PUPB].

Diagnosis: Both sexes of this new species can be easily distinguished from the other two Palaearctic species of *Entedonomphale* using the morphological characters indicated in the key above. The male of *E. bulgarica* sp. n. is somewhat similar to that of the Australian species *E. zakavyka* Triapitsyn, 2005 as both taxa have the funicle 2-segmented and the clava 3-segmented. However, the male forewing of *E. zakavyka*



FIGS 1-4

Entedonomphale bulgarica sp. n. (holotype female): (1) Antennae. (2) Mesosoma and metasoma. (3) Forewing. (4) Hind wing. Scale lines = 0.1 mm.



FIGS 5-9

Entedonomphale bulgarica sp. n. (paratype male from Pirin Mt., Bulgaria): (5) Antenna. (6) Mesosoma and petiole. (7) Forewing. (8) Hind wing. (9) Genitalia. Scale lines = 0.1 mm.

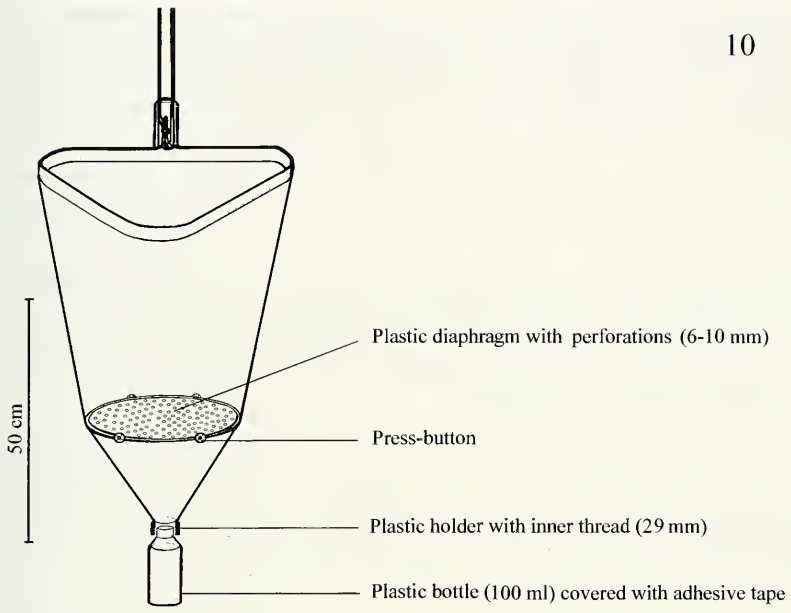


FIG. 10
Schematic diagram of the modified net for screen sweeping.

has a conspicuous transverse dark band in the middle, and F2 of its female antenna is slightly wider than long (Triapitsyn, 2005), whereas the male forewing of *E. bulgarica* sp. n. is only slightly infumate, and F2 of its female antenna is distinctly longer than wide.

DESCRIPTION: FEMALE (holotype): Body shining black with a slight violet tinge except petiole whitish (particularly distally) to light brown. Scape light brown (distally) to brown (basally), pedicel and flagellum brown to dark brown. Coxae and trochanters whitish to light brown, femora and tibiae brown to dark brown, tarsi mostly light brown.

Vertexal suture faint. Antenna (Fig. 1) with numerous setae, these denser on flagellar segments; scape slender, about 6 x as long as wide, only a little expanded in basal half; both funicular segments longer than wide, F1 slightly shorter and much narrower than F2, F1 with 1 longitudinal sensillum, F2 with at least 3 (possibly with 4) longitudinal sensilla; clava much longer than funicle, about 3 x as long as wide, with numerous (at least 12) longitudinal sensilla.

Mesosoma a little shorter than gaster (Fig. 2), mostly smooth (except pronotum lightly sculptured). Midlobe of mesoscutum with 1 pair of setae; anterior margin of scutellum almost straight. Scutellum shorter than mesoscutum, with 1 pair of setae and placoid sensilla at lateral margins. Forewing (Fig. 3) 3.2 x as long as wide; post-marginal vein very long for the genus, much longer than stigmal vein (2.4-2.6 x); longest marginal setae a little less than two fifths of maximal forewing width; disc with

a dark, transverse band behind stigmal and most of marginal vein (reaching posterior margin), more or less evenly setose in apical three fifths of forewing (setae short). Hind wing (Fig. 4) 8.0 x as long as wide; longest marginal setae about 1.1 x maximal hind wing width; disc with short setae, slightly infumate at apex of venation. Coxae weakly sculptured (hind coxa more so).

Petiole conspicuous, more or less cylindrical, 1.2 x as long as wide. Ovipositor short, occupying a little more than one third length of gaster, not exserted beyond gastral apex; ovipositor 0.6 x length of metatibia.

Measurements: Body (length of the dry specimen before slide-mounting): 859; head (length of the dry specimen before slide-mounting): 150; mesosoma: 455; petiole: 64; gaster: 470; ovipositor: 170. Antenna: scape (including radicle): 200; pedicel: 77; F1: 55; F2: 58; clava: 162. Forewing: 861:267; longest marginal seta: 100. Hind wing: 750:94; longest marginal seta: 106.

MALE (paratypes): Body length (of the dry specimens before slide-mounting): 673-863. Head and mesosoma shining dark brown to black, petiole light brown, antenna and gaster brown, legs light brown to brown. Antenna (Fig. 5) with a 2-segmented funicle (F1 subequal to F2, both a little longer than wide) and a 3-segmented clava with a long apical spicula, claval segments more or less subequal to funicular segments in size; scape 3.1 x as long as wide; all flagellar segments with numerous long setae exceeding each segment's width and without longitudinal sensilla. Midlobe of mesoscutum with 2 pairs of setae (Fig. 6). Forewing (Fig. 7) 3.5 x as long as wide; longest marginal setae about three fifths maximal forewing width; disc considerably less pigmented in the middle, only slightly infumate (more so behind stigmal and marginal veins), with cubital row of setae sinuate. Hind wing (Fig. 8) 9.3 x as long as wide; longest marginal setae about 1.6 x maximal forewing width; disc slightly infumate. Petiole more or less trapezoidal, 1.2 x as long as wide. Genitalia as in Fig. 9, typical for the genus.

ETYMOLOGY: The specific name (an adjective, gender feminine) refers to the country (Bulgaria) where this species occurs.

HOST: Unknown.

NOTE: The type specimens were collected on boggy grass communities and at the edge of a mowed agricultural field.

COMMENTS: The female of the new species was also compared with a recently identified specimen of *E. zakavyka* with the following label data: Australia, Queensland, car net between Goomeri and Petris on Hwy 17 87, 9.i.1986, E.A. Sugden [1 female, UCDC].

Entedonomphale carbonaria (Erdös)

Entedonomphale carbonaria (Erdös): Triapitsyn 2005: 285-286 (taxonomic history, diagnosis, figures, distribution).

MATERIAL EXAMINED: USA, Oregon, Tillamook Co., 4 km W of Sandlake, 2.vii.1991, S.L. Heydon [1 female, UCDC].

DISTRIBUTION: Europe (records from Bulgaria, Germany, Hungary, Russia, Slovakia, Slovenia, Sweden) (Triapitsyn, 2005) and North America (USA) [new record].

COMMENTS: As noted by Triapitsyn (2005), the Nearctic species *E. kaulbarsi* (Yoshimoto) might be a wingless (female only) form of *E. carbonaria*, as their other morphological features are identical; besides, their fully winged males are also identical. The discovery of the fully winged *E. carbonaria* in Oregon, USA, is puzzling. Further research using molecular methods will be necessary to address the limits of these species.

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